# Model 842-E-USB

## Dual Channel

## Virtual Power/Energy Meter

User's Manual

Newport®
Experience | Solutions

# EU Declaration of Conformity

We declare that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directive, 200489/108336/EEC and the Low Voltage Directive 73/23/EEC.

**Model Number:** 842-E-USB
**Year CE mark affixed:** 2008
**Type of Equipment:** Electrical equipment for measurement, control and laboratory use
**Manufacturer:** Newport Corporation
1791 Deere Avenue
Irvine, CA 92606
**Standards Applied:**

Compliance was demonstrated to the following standards to the extent applicable:

| Standard | Description | Performance Criteria |
|---|---|---|
| EN 61326 :1997 | Limits and methods of measurement of radio interference characteristics of information technology equipment. Testing and measurements of conducted emission | Class A |
| EN 61326 : 1997 | Limits and methods of measurement of radio interference characteristics of information technology equipment. Testing and measurements of radiated emission | Class A |
| EN 61000-4-2:1995 | Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 4.2: Electrostatic discharge. | Class B |
| EN 61000-4-3:1996 | Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 3: Radiated, Radio Frequency immunity. | Class A |
| ENV 50204: 1995 | Radiated Electromagnetic field from digital radio telephones- immunity test 900MHz pulsed | Class A |
| EN 61000-4-4:1995 | Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 4: Electrical fast transient/burst immunity. | Class B |
| EN 61000-4-6:1996 | Electromagnetic compatibility (EMC) – Part 4: Testing and measurements techniques- Section 6: Immunity to conducted Radio Frequency. | Class A |

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## Manual Updates

Dear Customer,

In an effort to keep the product you purchased optimized for your applications, Newport will on occasion update existing, and add new features to this instrument.

To utilize this new functionality will require an update to the instrument's firmware, which can be easily accomplished by the user, as described in this operator manual. As required, Newport will also generate a new version of this user manual, reflecting updates to the instrument.

Please check the Newport website (www.Newport.com) for newer versions of the firmware and the operator manual, which can be downloaded as a PDF file. Call your local Newport application specialist if you need support with locating or downloading these files.

Enjoy your new instrument!

# Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever first occurs.

### Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

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First printing 2011

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Newport Corporation
1791 Deere Avenue
Irvine, CA, 92606
USA

Part No. 90043186 rev A

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## Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

## Copyright and Trademark Information

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Visual Basic is a registered Trademark of Microsoft Corporation.
Visual C++ is a registered Trademark of Microsoft Corporation.

# Technical Support Contacts

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## Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

## IMPORTANT NOTE

Before plugging the instrument into a PC via a USB communication port, please make sure that the USB Drivers are installed. Run Setup.exe from the Software CD that came with your product. The installation program will configure the PC with the USB drivers.

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# 1 Safety Precautions

## 1.1 Definitions and Symbols

The following terms and symbols are used in this documentation and also appear on the Model 842-E-USB Optical Power/Energy Meter where safety-related issues occur.

### 1.1.1 General Warning or Caution

*Figure 1 General Warning or Caution Symbol*

The Exclamation Symbol in the figure above appears in Warning and Caution tables throughout this document. This symbol designates an area where personal injury or damage to the equipment is possible.

### 1.1.2 Electric Shock

*Figure 2 Electrical Shock Symbol*

The Electrical Shock Symbol in the figure above may appear throughout this manual. This symbol indicates a hazard arising from dangerous voltage. Any mishandling could result in irreparable damage to the equipment, and personal injury or death.

### 1.1.3 European Union CE Mark

*Figure 3 CE Mark*

The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

### 1.1.4 Waste Electrical and Electronic Equipment (WEEE)

*Figure 4 WEEE Directive Symbol*

This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, it is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative. See Section 9 for instructions on how to disassemble the equipment for recycling purposes.

### 1.1.5 Control of Hazardous Substances

*Figure 5 RoHS Compliant Symbol*

This label indicates the products comply with the EU Directive 2002/95/EC that restricts the content of six hazardous chemicals.

## 1.2 Warnings and Cautions

The following are definitions of the Warnings, Cautions and Notes that are used throughout this manual to call your attention to important information regarding your safety, the safety and preservation of your equipment or an important tip.

| | |
|---|---|
| | **WARNING**<br>**Situation has the potential to cause bodily harm or death.** |

**CAUTION**

**Situation has the potential to cause damage to property or equipment.**

**NOTE**

Additional information the user or operator should consider.

### 1.2.1 General Warnings

Observe these general warnings when operating or servicing this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp lint-free cloth.
- Lockout all electrical power sources before servicing the equipment.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Qualified service personnel should perform safety checks after any service.

### 1.2.2 General Cautions

Observe these cautions when operating or servicing this equipment:

- If this equipment is used in a manner not specified in this manual, the protection provided by this equipment may be impaired.
- Follow precautions for static sensitive devices when handling this equipment.
- This product should only be powered as described in the manual.
- There are no user-serviceable parts inside the 842-E-USB Optical Power/Energy Meter.
- To prevent damage to the equipment, read the instructions in the equipment manual for proper input voltage.
- Adhere to good laser safety practices when using this equipment.

## 1.3 Additional Safety Information

Do not use the 842-E-USB if the instrument or the detector looks damaged, or if you suspect that the 842-E-USB is not operating properly.

Appropriate installation must be done for water-cooled and fan-cooled detectors. Refer to the specific instructions for more information. The user must wait for a while before handling these detectors after power is applied. Surfaces of the detectors get very hot and there is a risk of injury if they are not allowed to cool down.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, it is suggested to try to correct the interference by taking one or more of the following steps:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment to an outlet that is on a different circuit than the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

# 2 General Information

## 2.1 Introduction

To obtain full performance from the 842-E-USB and the PC 842-E-USB, the application software, we recommend that you read this manual carefully.

The PC 842-E-USB software transforms your PC screen into a large 842-E-USB screen enabling you to control and see your information from a distance and transfer data to a PC for sophisticated data analysis.

The 842-E-USB is a microprocessor-based power and energy meter that uses the latest technology to provide a multitude of options in a user-friendly environment. It is a complete power and energy meter that can provide a statistical analysis of your measurements.

There is no need to enter the head specifications when connecting the new Newport power or energy detectors. The 842-E-USB is already internally set up to accept all the Newport Hi power wattmeter and joulemeter heads with a DB-15 connector. The 842-E-USB is not compatible with the 818 or 918D series photodiode detectors.

*Figure 6 842-E-USB Virtual Power/Energy Meter*

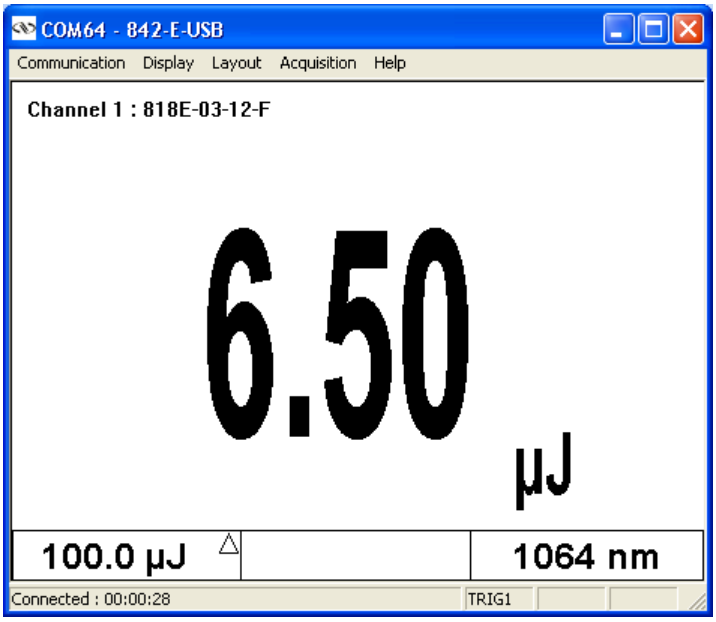



*Figure 7 PC 842-E-USB User Interface*

## 2.2 Unpacking and Handling

Each Newport 842-E-USB is thoroughly tested and calibrated prior to shipment.

It is recommended that the Model 842-E-USB Virtual Power/Energy Meter be unpacked in a lab environment or work site. Unpack the system carefully; small parts and cables are included with the instrument.

You can download the latest software version for the PC 842-E-USB (and install it on your PC) and for the 842-E-USB (and install it on the 842-E-USB) with the serial interface anytime from our website www.newport.com.

You can download the PC 842-E-USB program from our website. Go to the **Downloads** section of our website: www.newport.com. Click on the file name and download it to your PC. The specific actions necessary vary between browser and browser settings. After it is transferred, open the file on your PC and follow the instructions to uncompress and install it.

### 2.2.1 Parts List

The following is a list of parts included with the 842-E-USB Handheld Power Meter. Please make sure everything is present before discarding packing materials.

- 842-E-USB Dual Channel, Virtual Optical Power/Energy Meter
- USB cable
- A CD containing software and user manual

## 2.3 Inspection for Damage

The Model 842-E-USB Optical Power/Energy Meter is carefully packaged at the factory to minimize the possibility of damage during shipping. Inspect the box for external signs of damage or mishandling. Inspect the contents for damage. If there is visible damage to the instrument upon receipt, inform the shipping company and Newport Corporation immediately. Any damage claim should be made promptly to the transportation company. It is strongly recommended that you save the packaging material in case you need to ship your equipment in the future.

**WARNING**

**Do not attempt to operate this equipment if there is evidence of shipping damage or you suspect the unit is damaged. Damaged equipment may present additional hazards to you. Contact Newport technical support for advice before attempting to plug in and operate damaged equipment.**

## 2.4 Calibration

Calibration of the power meter is done at the factory by defining a slope and offset, for all ranges as determined for each detector type.

Newport recommends annual factory re-calibration to ensure the continued accuracy of power meter measurements.

Please refer to the "Maintenance and Troubleshooting" section for contact information for re-calibration of your power meter.

## 2.5 Specifications

The following specifications are based on a one-year calibration cycle, an operating temperature of 18 to 28ºC (64 to 82ºF) and a relative humidity not to exceed 80%.

| | ***Power meter specifications*** |
|---|---|
| **Power Range** | 1 uW to 10 kW |
| **Power Scales**<br>**(thermal head)** | 15 scales: 300uW, 1 mW, 3mW, 30mW, 100mW, 300mW, 1W, 3W, 10W, 30W, 100W, 300W, 1kW, 3kW, 10kW |
| **Resolution (digital)** | Normal mode: Current scale/2048<br>ASCII mode: Current scale/32768 |

| | |
|---|---|
| **Wattmeter mode Accuracy** | ±0.75 % ±2.5 µV from 10% to full scale[1] |
| **Response Time (accelerated)[2]** | 1 sec |
| **Sampling Frequency** | 100 Hz |
| **Statistics** | Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Time |
| | |
| | ***Energy meter specifications*** |
| **Energy Range** | 0.08µJ to 20 kJ |
| **Energy Scales** | 20 scales: 10uJ, 30uJ, 100µJ, 300µJ, 1mJ, 3mJ, 10mJ, 30mJ, 100mJ, 300mJ, 1J, 3J, 10J, 30J, 100J, 300J, 1kJ, 3kJ, 10kJ, 30kJ |
| **Resolution (digital)** | Normal mode: Current scale/4096<br>Ascii mode: Current scale/32768 |
| **Accuracy[3]** | 1.0 %±50 µV < 500 Hz<br>2.0 %±50 µV 500 Hz to 1.2 kHz<br>3%±50 µV 1.2 kHz to 6 kHz<br>6%±50 µV 6kHz to 10 kHz |
| **Average Power accuracy** | Frequency Accuracy error + Joulemeter accuracy. |
| **Frequency Accuracy** | 0.1 to 1000 Hz : 1%±0.1 Hz[4]<br>1000 to 2000 Hz : 2%±0.1 Hz[4]<br>5000 to 10000 Hz : 3%±1 Hz[4] |
| **Default Trigger Level** | 2 % |
| **Software Trigger Level** | 0.1% to 99.9%, 0.1% resolution |
| **Real Time Data Transfer** | 10 kHz/Channel in Normal mode no missing point with USB 2.0 or Ethernet and recommended PC. |
| **Statistics** | Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Pulse #, Repetition Rate, Avg Power |
| **Data Storage** | Limited to PC hard drive free space |
| | |

[1] The 2.5µV bias can introduce an error into low power measurements with low sensitivity detectors. It is essential to use the Zero Offset to rezero the 842-E-USB before making a measurement in these conditions. It is always good practice to use the Zero Offset. See section 2.2.

[2] Varies with detector head.

[3] Including linearity.

[4] With the recommended PC, no graphic display, usb latency set to 1ms and no other applications running.

| | ***General Specifications*** |
|---|---|
| **Digital Display** | Computer screen |
| **Display Rate** | 3 Hz in Real time mode.<br>15 Hz in Graphic mode. |
| **Data Displays** | Real time, Ratio, Line plot, Histogram, Statistics and 3D Histogram. |
| **User input correction factors** | 1 multiplier and 1 offset (7 digits floating point) |
| **Positive External trigger** | 3 to 24 V @ 13 mA, optically isolated. |
| **External trigger pulse width** | 2 us minimum, no maximum time. |
| **Internet Upgrades** | Yes |
| **PC Serial Commands** | Yes |
| **Dimensions**<br>**(connectors included)** | 147 (L) x 106 (W) x 34 (H) mm |
| **Weight** | 0.424 kg |
| **Power Over USB** | Yes |

# 3 System Overview

## 3.1 Connector Descriptions

*Figure 8 Rear View of 842-E-USB*

1. USB Interface Connector – This interface allows remote control and data transfers between the 842-E-USB and a computer that has a USB communication port.
2. External Trigger – The Input connector is a Female BNC. The External trigger is TTL compatible. The monitor detects a trigger on the rising side of the external trigger signal. To measure accurately, the trigger must be just before the laser pulse, or just after. For Example, a Joulemeter with a 20uS rise time, the External trigger must be 4 us before or 19us after the laser pulse.

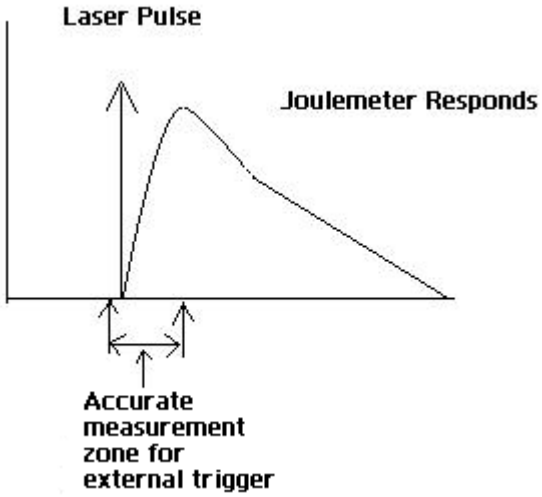



*Figure 9 Trigger zone of 842-E-USB*

*Figure 10 Detector connectors for 842-E-USB*

3. DB15 Detector Connectors – The 842-E-USB uses a DB-15 female connector to mate with the detector heads (probes).

# 4 System Operation

## 4.1 Quick Startup Guide

This section applies to all 842-E-USB versions. It quickly shows you how to make a laser power and energy measurement with the 842-E-USB and a Newport power (818P series) or energy detector (818E series).

The monitor automatically recognizes all the compatible Newport detectors. All custom technical data required for optimum operation of the detector will be automatically downloaded from the EEPROM in the DB-15 connector. This data includes sensitivity, model, serial number, version, wavelength correction factors, and time response.

The first 11 steps are for 842-E-USB initialization, and steps 12 to 14 refer to the PC interface with 842-E-USB.

1. Install the power or energy detector head.
2. Turn the 842-E-USB off (unplug it) and connect a version 5 (or higher) power or energy detector head to the 842-E-USB using the **Detector INPUT DB15**. Turn the 842-E-USB off before connecting a new head in order to prevent any loss of information. The 842-E-USB only reads the EEPROM head on a power cycle or on a Reset Device command, because the 842-E-USB keeps the last head sensibility and configuration. To avoid any loss of information, be sure not to insert a head while the 842-E-USB is being powered-up or while you send the Reset Device command.
3. Slide the latch to the left to lock the connector into place.
4. Switch the 842-E-USB ON (plug it in)
5. Power heads will default the 842-E-USB to power measurement; energy heads will default the 842-E-USB to energy measurement.
6. Remove the head's protective cover. Put the detector head into the laser beam path. The entire laser beam must be within the sensor aperture. Do not exceed maximum specified densities, energies or powers. For the most accurate measurement, spread the beam across 60% to 80% of the sensor area.

**CAUTION**

**818P series Thermopile detectors can be used for both cw and pulsed lasers. 818E series Pyroelectric detectors can only be used for pulsed lasers.**

7. For power heads (using the 842-E-USB), go to step 8. For energy heads, go to step 11.

**Adjusting the zero (steps 8 to 10)**

8. Block off laser radiation to the detector.
9. The power read by the PC 842-E-USB when no laser beam is incident on the detector may not be exactly zero. The detector is either not thermally stabilized OR there was a heat source in the field of view of the detector when you turned on the 842-E-USB.
10. To reset the zero, wait until the reading has stabilized, right click and select **Zero Offset**. You are now ready to make an accurate measurement.

**Notes:**

- Refer to specific power detector documentation for complete installation and operating instructions.
- The power detectors are thermal sensors sensitive to temperature variations.

For high-precision measurements, we recommend:

- Allowing the power detector temperature to stabilize before zeroing the 842-E-USB.
- Not touching the detector head when handling the power detector. Touch the stand.
- Avoiding forced airflow or drafts around the detector.

11. Apply the laser beam to the detector head. The laser beam average power or energy will be displayed on the computer screen.
12. If the USB drivers and/or PC 842-E-USB have not been installed, install the USB drivers (see 3.1.1) then install the application software (self-directed).
13. Start the PC 842-E-USB software on the PC. Click Start /Programs /NEWPORT/ PC 842-E-USB.

14. To connect the PC 842-E-USB to the device, select the correct COM Port (see section 3.2.1) and click Reconnect. You should see values pertaining to the current settings on the PC 842-E-USB.
15. To replace a detector, turn off the PC 842-E-USB, unplug the 842-E-USB, insert the new head, plug in the 842-E-USB, and restart the PC 842-E-USB

## 4.2 User Interface

Start the PC 842-E-USB software on the PC. Click Start /Programs /NEWPORT/ PC 842-E-USB.

Make a connection with the 842-E-USB: Select communication/open and select the com port, see section 1.7.

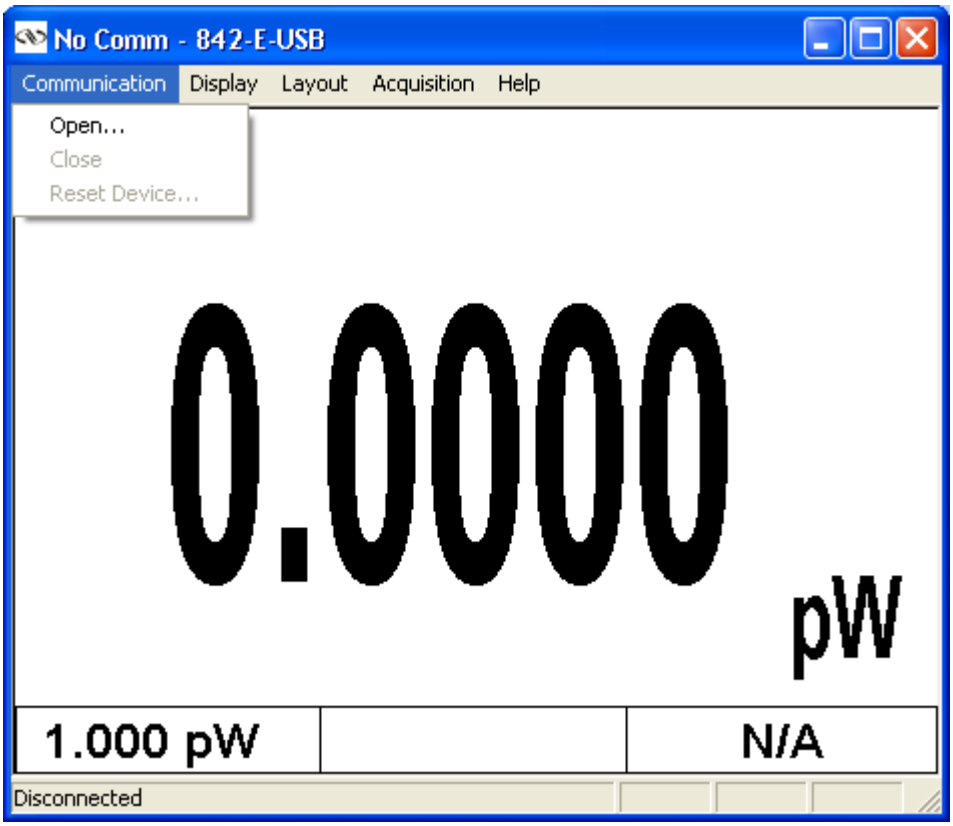



*Figure 11 Communication Initialization*

### 4.2.1 Real Time Display

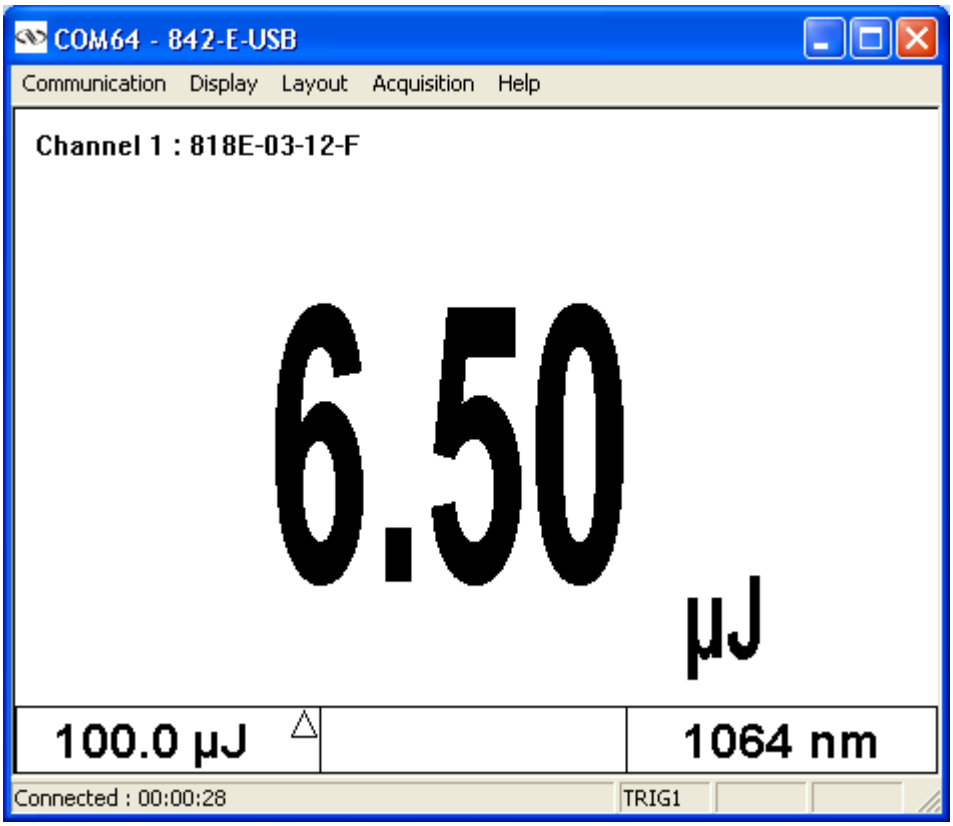



*Figure 12 Real Time Display*

**In Power mode:**

The display is updated at 3Hz. The lower window shows the Scale, current offset value and wavelength. You can change the scale using the quick arrows beside the scale value. When you change the scale, the acquisition and all display modes will stop for a few milliseconds.

**In Energy mode:**

The display is updated at 3Hz. But all data in the statistics are updated at up to 10 kHz in real time. Single shot measurement is always good. When you change the scale you might have a false measurement but the next measurement is accurate. There is no need for "Zero offset" in energy mode because the 842-E-USB compensates for an analog drift.

The information bar at the bottom shows the scale and wavelength. The middle box is blank in energy mode. You can change the scale using the quick arrows beside the scale value. When you change the scale, the acquisition and all display modes will stop for a few milliseconds.

### 4.2.2 Status Window

In the Status window you can select the channel, scale, wavelength, trigger level, correction factor, file name, data sampling and external trig option. All acquisitions and measurements are stopped while you are in the Status Window. To save your settings, select File/ Save Status. To load your setting, select File/load status. You must not load a wattmeter status when using an energy detector or a joulemeter status when using a power detector. PC-842-E-USB will remember your last Status setting files under File.

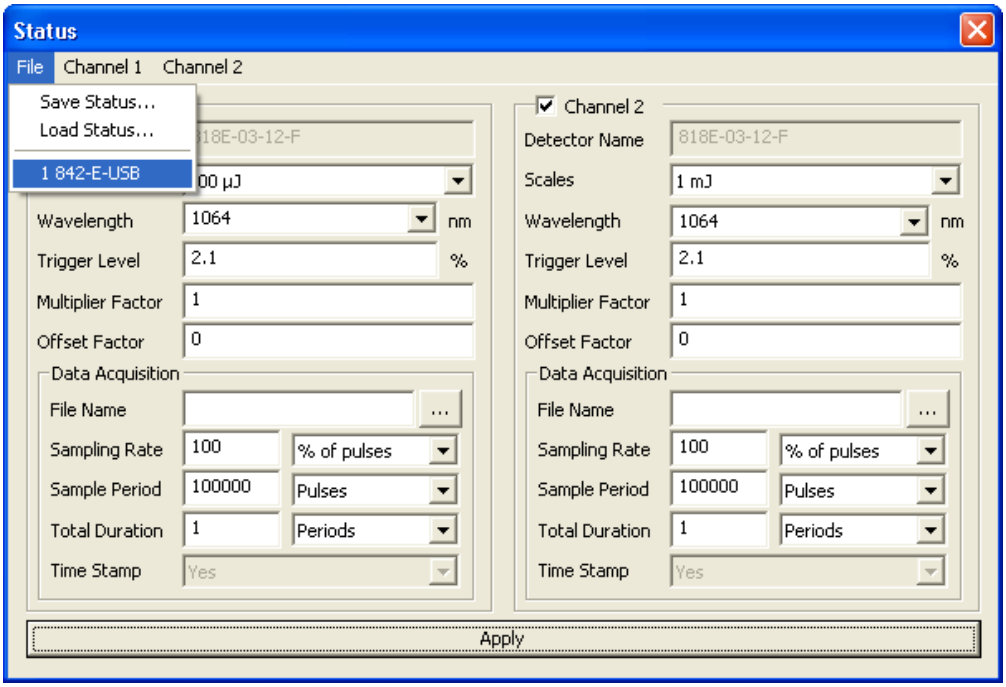



*Figure 13 Status Window*

### 4.2.3 Selecting the Channel to Display

Right click on the display window and select the channel you wish to display.

### 4.2.4 Adjusting the Window Display

Select Display/Split with a right click on the window or from the menu bar. To save your layout, select Layout, save layout. To load your saved layout, select Layout, load layout or the filename that appears at the bottom.

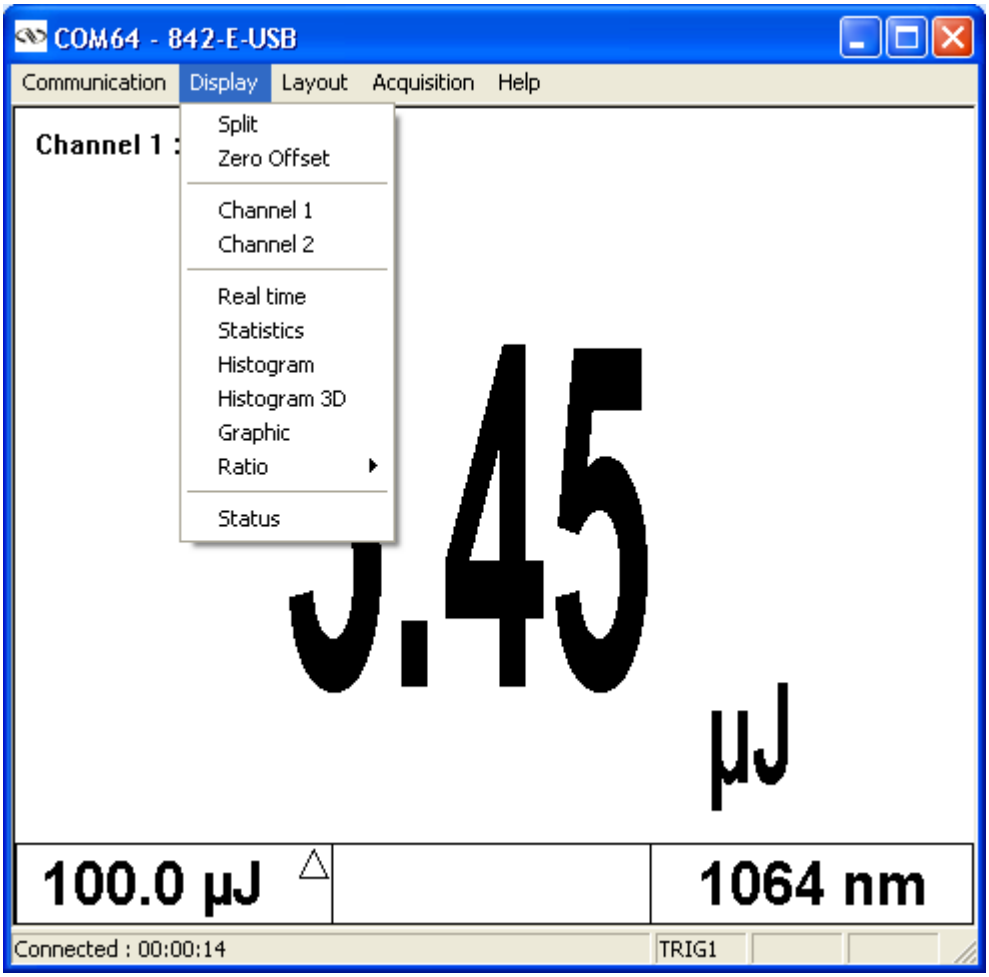



*Figure 14 Display Menu*

### 4.2.5 Graphic Display

To adjust the real time graphic double click on the left side of the y axis. The X-Axis minimum and maximum settings are only available in the Load File option. You can use the mouse wheel to zoom in or out. Left click on the graphic line to change the line position. Double click in the graphic window to pause and get the numerical values in the graphic. The Time setting is in the Graphic display time menu for the X axis.

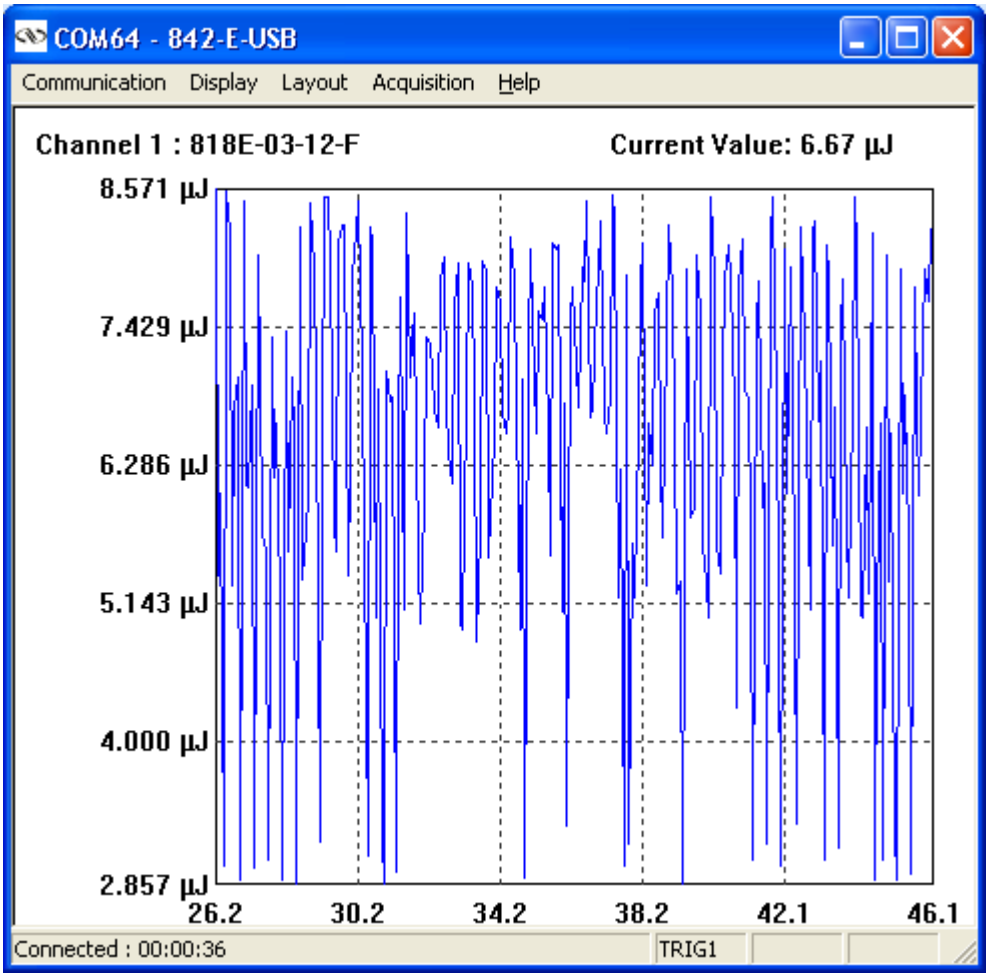



*Figure 15 Graphical Display*

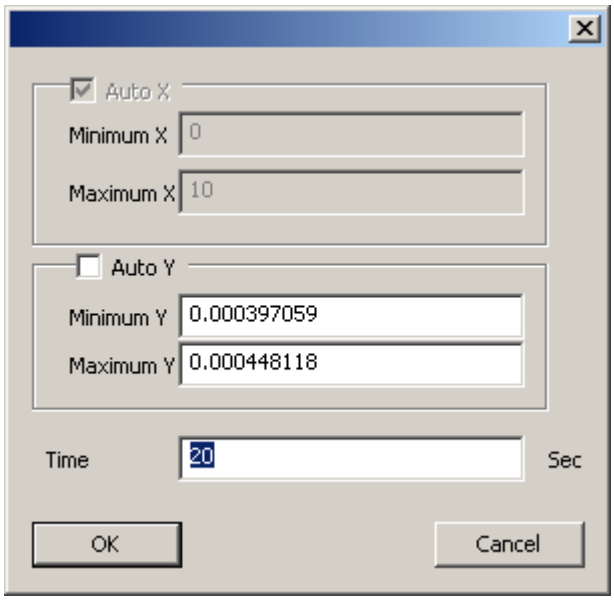
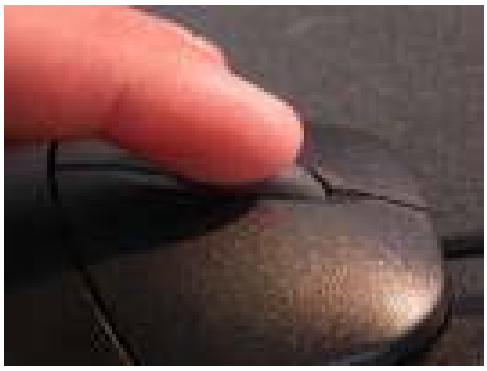



*Figure 16 Graphical Display Settings*

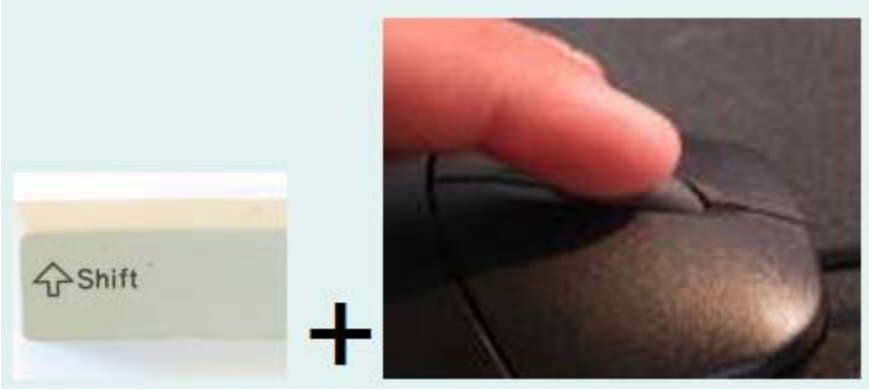
### 4.2.6 Graphic Mode Option After Opening a File Using Load File Menu

In the Status Menu, Select a file name for the file to save or to view.

To adjust the graphic axis, double click on the left side of the Y axis. Deselect the Auto mode to enter the axis values. You can also use the mouse wheel to zoom in or out. You can zoom the X axis using the mouse wheel while holding the Shift key. Left click on the graphic to change the line Y position. If you are zooming the X axis, you can Left click on the graphic and move the center X position. Double click in the graphic window to get the numerical values in the graphic.



*To zoom the Y axis*




*To zoom the X axis in the Load File option*

### 4.2.7 Restarting the Lineplot, Statistics, and Histogram

Each window is independent. You can clear each window or use the “Clear All” menu. You can use a Right-click in the Window to select “Clear” or “CLEAR ALL”. When you select Clear the Graphic, histogram and statistic restart.

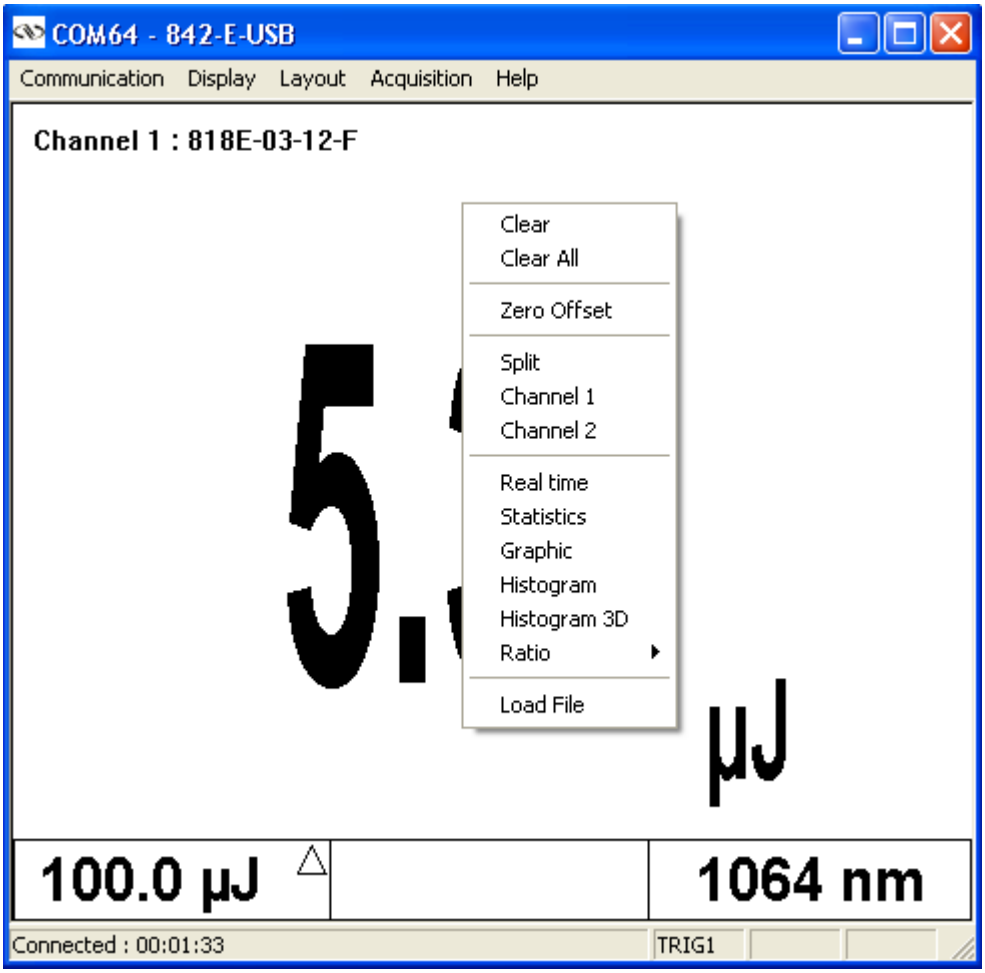



*Figure 17 Clear and Clear All options*

### 4.2.8 Data Acquisition

To start an acquisition you have to enter the file name in the status menu and select Acquisition/Channel. A recording message will appear on the bottom of the screen while recording. To stop an acquisition, reselect Acquisition/Channel #. The scale's quick arrows on the real time display are unavailable during an acquisition. If you do not select a directory, all save files will be in C:\Program Files\Newport\842-E-USB.

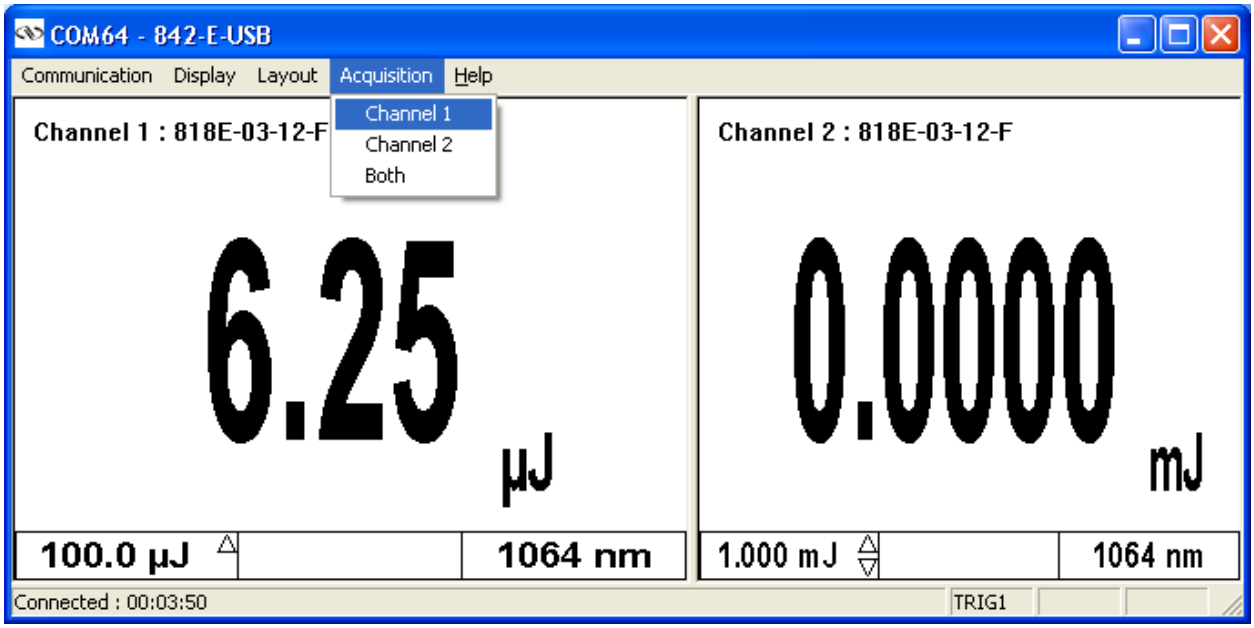



*Figure 18 Data Acquisition Mode*

### 4.2.9 Pausing the Statistics and Lineplot

Click on the Statistics window or line plot.

### 4.2.10 Zeroing

For Power heads only, right click in any window and select “Zero Offset”, the offset value will be displayed in the lower center of the Real time display.

### 4.2.11 Ratio Measurement

In energy mode, the ratio is made with the last received measure to the 842-E-USB. Ratio mode doesn’t work if you have a power head and an energy head.

Example:

| Laser value channel #1 | Laser value channel #2 | Results CH1/CH2 |
|---|---|---|
| 10 J | 5J | 2 |
| No pulse | 2J | 5 |
| 8J | No pulse | 4 |
| 12J | 4J | 3 |

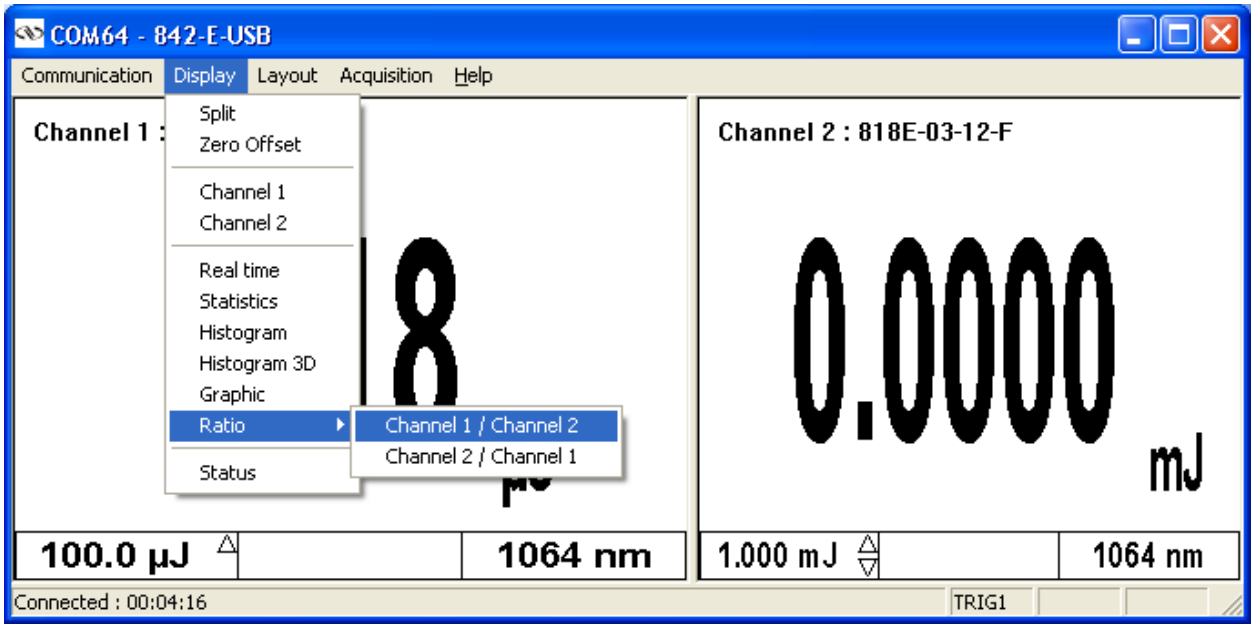


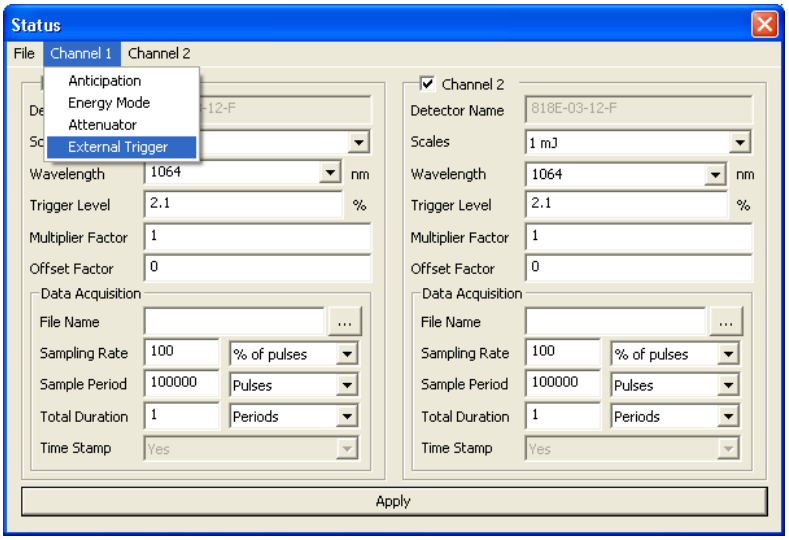

*Figure 19 Ratio Measurement*

## 4.2.12 Detecting Missing Laser Pulses

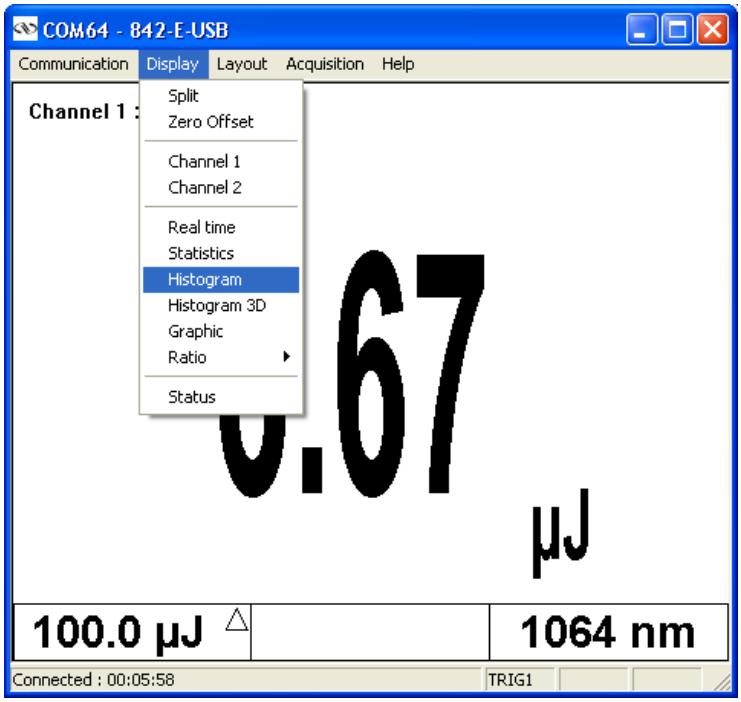
The 842-E-USB will detect the missing laser pulses using the External Trigger and the Histogram Display.

Step1: Connect the External trigger of your Laser to the External trigger of the 842-E-USB using the BNC connector.

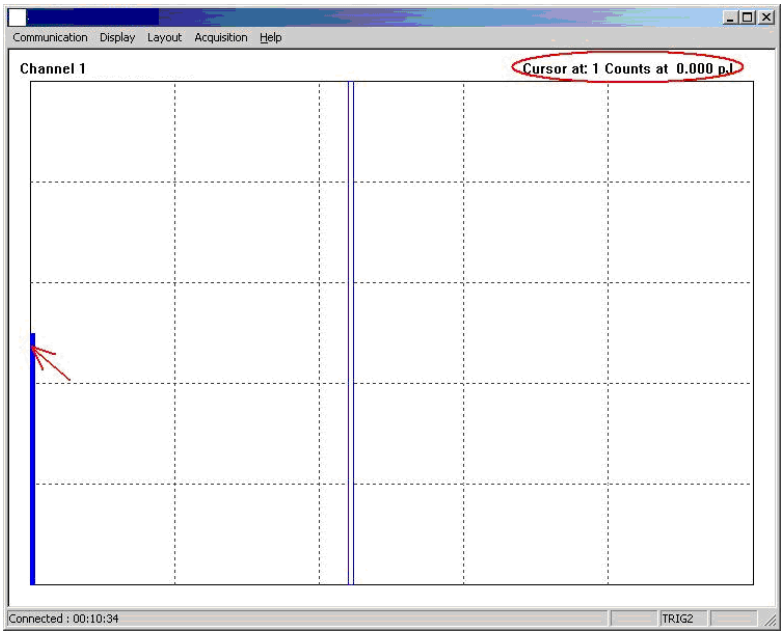
Step2: Select the External trigger from the Status Window.




Step3: Select the Histogram Display in the Display Menu.




Step4: Start your laser and place you Cursor on the left x-axis, the upper corner of the histogram will show the number of pulse that are missed. You can reset the histogram using the clear command.

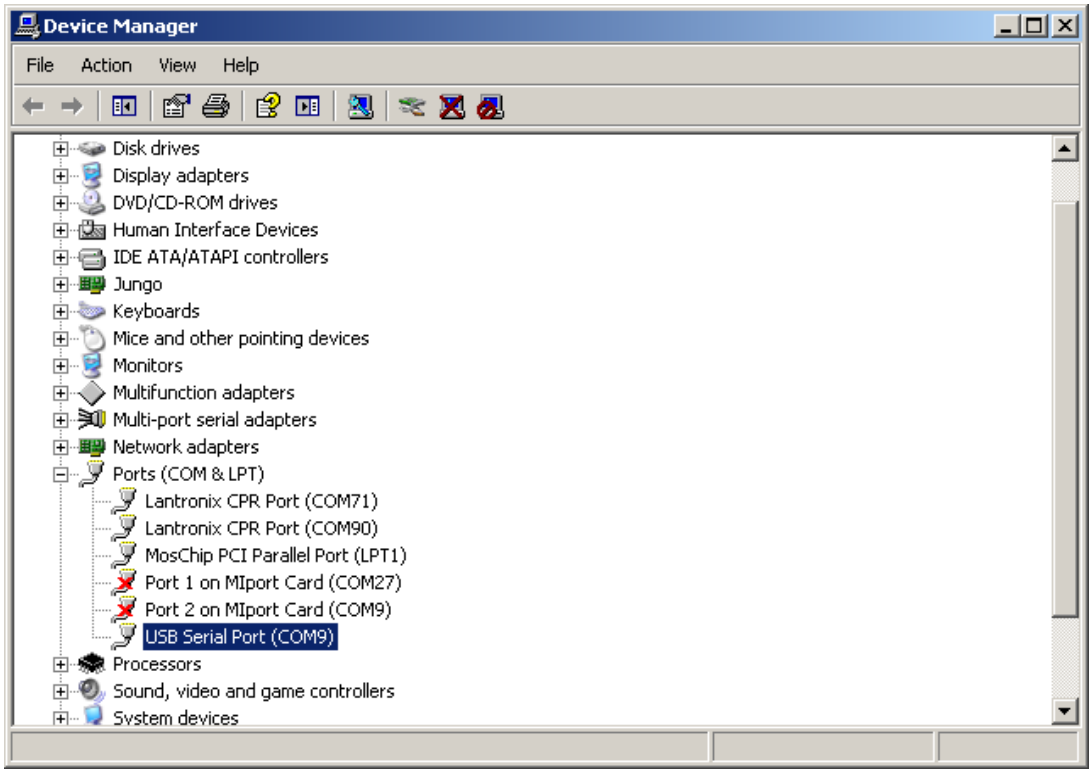


# 5 Software Installation

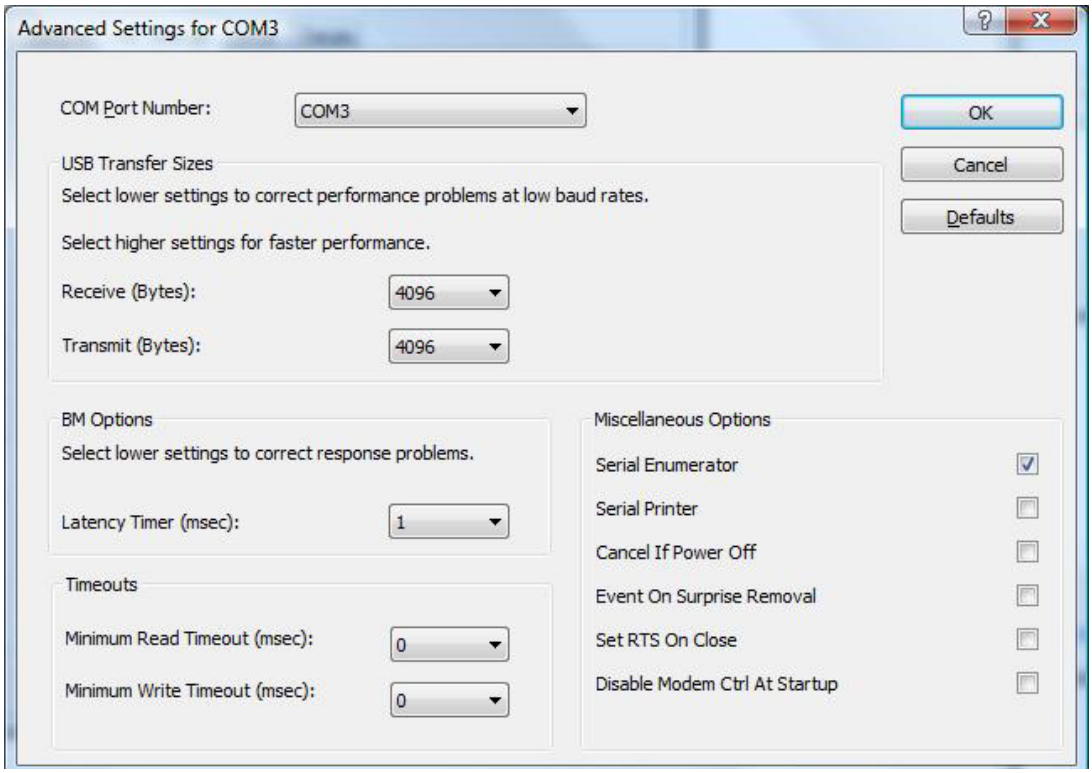
## 5.1 Recommended Specifications of PC

Basic functions work well on PCs dated 2004 and later. If you want to measure higher than 1 kHz and/or display the 3D histogram you have to have a computer and a graphics card like a Intel core 2 CPU 6420 2.13 Ghz, 4 of ram and a Nvidia Geforce 7300 LE or better.. If you want to be sure to get all points and you have a laser frequency above 1 kHz, do not run other programs at the same time. If you want a very accurate frequency measurement and average power in energy mode do not run the 3D graphic display. The supported operating systems are Windows XP, window 7 and Vista.

In statistics mode the frequency measurement resets itself after the pulse number reaches the number of pulses set in the Status menu. If you want the reset to occur less frequently, set a very large number. In order to have a precise frequency measurement above 1 kHz set the Latency Timer to 1 ms in USB Advanced Settings. To access the Latency timer menu, in the Device Manager click **Start → Settings → Control Panel → System → Device Manager.**




Go to USB port properties, Select Port parameters and select Advanced.



## 5.2 Installation And Communication

### 5.2.1 Installation of Application Software

The 842-E-USB is not required for the PC 842-E-USB software installation; however, it is fine as well if it is connected. Ensure that the 842-E-USB is connected to the USB port when you are ready to run the PC 842-E-USB software.

Connect the 842-E-USB USB port, located on the rear panel of the instrument (see Figure 8), to the host device serial connector using the proper cable. The 842-E-USB comes with a standard USB cable. You must install the USB drivers.

### 5.2.2 Installation of USB drivers for Windows™

Plug the 842-E-USB into a USB port on the PC. If the PC supports USB 1.1, Windows detects the new device and prompts you for the software drivers. A window that says **Found New Hardware – USB** Device opens and after several seconds to a minute the Found New Hardware Wizard appears.

Insert the USB driver's CD-ROM if you have not already done so.

Cancel the wizard and execute the Auto installer, "USB driver installer-R2" which can be found in the USB Driver folder on the CD-ROM.

At the end of this process, a new serial COM port is added to the list of communication ports. It may be used as any other serial port. You will need to know the COM port number to set up the serial connection to the 842-E-USB.

## 5.3 Setting Up Communication to 842-E-USB

### 5.3.1 Verifying COM Port

To verify the USB installation and find the COM port number click:

**Start → Settings → Control Panel → System → Device Manager**

Scroll down to **Ports (COM & LPT)** and double click that line. One of the options should be

**USB-to-Serial (COM#)**

Note the COM port number. You need it for the next step.

### 5.3.2 Installation of the PC Software

Download PC 842-E-USB from the internet, www.newport.com, in the Download section. Execute the downloaded file by double-clicking it, or, if the internet browser has the option of executing the file, execute it from the

current location on the website. Follow the installation procedure as prompted by the software until it is completed.

### 5.3.3 Running the Software

#### 5.3.3.1 Start the software application

Ensure that the 842-E-USB is connected to the PC 842-E-USB by either using the USB cable. Verify the COM port to ensure a proper connection. Start the PC 842-E-USB by clicking Start > Programs > Newport > PC-interface(842-E-USB) menu.

#### 5.3.3.2 Ensure that the correct COM port is selected

Ensure that the correct COM port is selected in the Status Info Section of the Front Panel. If the PC 842-E-USB cannot communicate with the 842-E-USB, an error message such as ”Could not communicate with device, please verify connections” is displayed in the Notification section of the Front Panel, right next to the flashing light (indicating an error). You must remake the connection if you change the physical connection or the COM port.

#### 5.3.3.3 Exit the software application

To save some important PC 842-E-USB settings, exit using the File > Exit menu or the Ctrl-F4 hotkey. PC 842-E-USB.

### 5.3.4 Connecting 842-E-USB

You may use any serial communications software that you are familiar with. Our instructions are for HyperTerminal because it is widely available on PCs with Windows™. Click:

**Start → Programs → Accessories → Communications → HyperTerminal**

To save communication settings, enter a name for the connection. In the drop down menu “**Connect using**” select the COM port that the USB driver was installed on (Section 3.2.1). Click **OK**.

Input the following settings into the communications parameter window that appears next.

| | |
|---|---|
| **Bits per second** | **921600** |
| **Data bits** | **8** |
| **Parity** | **None** |
| **Stop bits** | **1** |
| **Flow control** | **None** |

Click **OK** to begin entering serial commands in the HyperTerminal window.

### 5.3.5 Echo On/Off

The commands you type do not appear in the HyperTerminal window, unless you set the HyperTerminal up to do so. Only the response from the 842-E-USB is displayed. If you prefer to see the commands you are typing, on the HyperTerminal window click the **File** menu and execute the following sequence:

> **File → Properties → Settings** (tab) → **ASCII setup** → select "**Echo typed characters locally**" → **OK**

### 5.3.6 Testing Connection

In the HyperTerminal window type ***VER**, press ↵ **ENTER**. If the response you receive tells you the version of your 842-E-USB, you are successfully connected and ready for serial command action.

### 5.3.7 HyperTerminal Setting Shortcut

When you end the session, HyperTerminal asks you if you want to save your settings. To avoid re-entering the communication parameters, save them by clicking **yes**. The next time you execute the string of commands shown in section 3.2.2 above, the name of your session will appear after HyperTerminal. Clicking on the session name opens the connection using the saved settings. To avoid re-entering the string of commands, put a shortcut to this file on your desktop:

Find the file name, right click on it and select **Shortcut** in the drop down menu.

# 6 Communication Command Reference

## 6.1 Command Description

### 6.1.1 Command Glossary

The star (*) is part of each command.

| | |
|---|---|
| *AT1x / *AT2x | To set the Attenuator to Channel 1 or 2<br>x= 0 = disable, x = 1= enable<br>Default value is 0.<br>***Example:*** Enter ***AT10** to disable the attenuator for Channel 1.***Example:*** Enter ***AT21** to enable the attenuator for Channel 2. |
| *CA1 / *CA2 | To Send the data points of Channel 1 or 2 through the serial port at the frequency of a laser for an Energy head or at 100Hz for a power head.<br>Output in ASCII mode is:<br>Wattmeter : 6 digit resolution in Watt<br>Example:<br>1:0.001101 : 1.1001 mW on channel 1.<br>2:100.231 : 100.231 Watts on channel 2.<br>Energy Mode: 4 digits in scientific notation.<br>2:8.808e-07 : 0.8808 uJ on channel 2<br>If you have a repetition rate higher than the ASCII specification, the monitor sends you an error message. If it does, try sending the *SS100x command to ignore some laser pulses.<br>By default the monitor is set in binary mode. To set the ASCII mode, send the serial commands *SS1001 for channel 1 or *SS2001 for channel 2. |
| *CS1 / *CS2 | To end/exit the *CA1 or *CA2 mode. |
| *AN1x / *AN2x | For Power heads only. To set the Anticipation for Channel 1 or 2.<br>x= 0 = disable, x = 1= enable<br>Default value is 1.<br>***Example :*** Enter ***AT10** to disable the anticipation for Channel 1.<br>***Example :*** Enter ***AT21** to enable the anticipation for Channel 2. |

| | |
|---|---|
| *RST | To reset the device. The monitor will read the head's EEprom again. |
| *PW1 /<br>*PW2 | To set the Wavelength for Channel 1 or 2.<br>Wavelength correction command (5+ characters).<br>***Example :*** To select the wavelength 1064 nm, enter ***PW101064**. ***Example :***<br>To select the wavelength 10600 nm, enter***PW110600**. |
| *TL10002<br>/<br>*TL20002 | To modify the trigger level in energy mode<br>*TL1XXXX / *TL2XXXX where XXXX are four characters representing the trigger level (in percent) needed.<br>for example :<br><br>XXXX = 0002 for a trigger level of 2%<br>XXXX = 00.5 for a trigger level of 0.5 %<br>XXXX = 11.4 for a trigger level of 11.4%<br>XXXX = 0050 for a trigger level of 50%<br><br>Note : the "." is indeed a character |
| *VER | To display the version of the software. |
| *ST1/<br>*ST2 | To display information about current status.<br>See table 1 |
| *SSX000 | To set to Binary or ASCII mode.<br>Example:<br><br>*SS1000: Binary Mode for channel 1<br>*SS1001: ASCII mode sends All points<br>*SS1002: ASCII mode sends 1 out of 2 points<br>*SS1003: ASCII mode sends 1 out of 3 points<br>*SS1999: ASCII mode sends 1 out of 999 points ( 999 is the maximum )<br>*SS2001: ASCII mode sends All points for channel 2<br><br>Default value is 0 (Binary mode)<br>Contact Newport for Binary mode description.<br>Note: The PC-842-E-USB will not work properly if you set the 842-E-USB to ASCII mode. |
| *SU1 /<br>*SU2 | To make a physical scale up for channel 1 or 2.<br>You must stop the continuous acquisition (*CS1, *CS2), before sending this command. |
| *SD1 /<br>*SD2 | To make a physical scale down for channel 1 or 2.<br>You must stop the continuous acquisition (*CS1, *CS2), before sending this command. |
| *ET1x /<br>*ET2x | To Set the External Trigger for Channel 1 or 2.<br>x= 0 = disable, x = 1= enable<br>Default value is 0.<br>***Example :*** To disable the External trigger for Channel 1 enter ***ET10** .<br>***Example :*** To enable the External trigger for Channel 2 enter ***ET21** .<br>You must stop the continuous acquisition (*CS1, *CS2), before sending this command. |
| *EM1x / | For Power heads only. To set the energy Mode to Channel 1 or 2. |

| | |
|---|---|
| *EM2x | x= 0 = disable, x = 1= enable<br>Default value is 0.<br>***Example :*** To disable the Energy mode for Channel 1 enter ***EM10** .<br>***Example :*** To enable the Energy mode for Channel 2 enter ***EM21**.<br>You must stop the continuous acquisition (*CS1, *CS2), before sending this command. |
| *NMV | Active the acknowledge mode<br>This function tells the 842-E-USB to send an ACK after each serial commands received<br>The PC-842-E-USB will not work if you send this command and don't send the *NMQ, *RST or don't cycle the power before trying to make a connection. |
| *NMQ | Deactivate the *NMV mode (Default mode) |
| *NA1 /<br>*NA2 | Return the detector name for channel 1 or 2. |
| *SN1 /<br>*SN2 | Return the detector serial number for channel 1 or 2. |
| *CV1 /<br>*CV2 | Return the last 842-E-USB measurement for channel 1 or 2. This mode is only available in ASCII mode.<br>For joulemeter mode it will be the last laser pulse value, for wattmeter mode it will be the last measurement taken.<br>Example to get only 1 value<br>Set the ASCII mode for channel 1 or 2.<br>*SS1001 or *SS2001<br>Set the scale for channel 1 or 2.<br>*SC1XX or *SC2XX, where XX is the scale you want in decimal.<br>Set the poling mode<br>* VNM<br>Start the internal acquisition<br>*CA1 or *CA2<br>Request 1 Value for channel 1 or 2.<br>*CV1 or *CV2 |
| *VNM | Activate the *VNP polling mode, This mode is only available in ASCII mode |
| *VNP | Deactivate the *CV1 and *CV2 mode (Default mode at power up) |
| *RG1 /<br>*RG2 | Return the current minimum and maximum range for channel 1 or 2.<br>The information is coded<br>The fist 5 byte is the identifier<br>00000: minimum scale.<br>00001: maximum scale.<br>10000: End of transmission.<br>The last 4 bytes are the scale coded in hex value, use the scale table bellow to determine the scale<br>Example<br>After a RG1 you will receive<br>":000000013<br>:00001001A<br>:100000000"<br>What it means |

| | |
|---|---|
| | :000000013 : is the minimum scale 13 hex = 19 = 3m<br>:00001001A : is the maximum scale 1A hex=26=10 (Watt or Joule)<br>:100000000 : End of transmission. |
| *SC1xx /<br>*SC2xx | To set the Scale to Channel 1 or 2.<br>xx = See Table bellow, you send the value for the scale in decimal, but when making a status request the 842-E-USB send it in Hexadecimal.<br>You must stop the continuous acquisition (*CS1, *CS2), before sending this command. |

| Scale | xx | |
|---|---|---|
| 1p | 00 | *1 picowatt or picojoule* |
| 3p | 01 | *3 picowatts or picojoules* |
| 10p | 02 | *10 picowatts or picojoules* |
| 30p | 03 | *30 picowatts or picojoules* |
| 100p | 04 | *100 picowatts or picojoules* |
| 300p | 05 | *300 picowatts or picojoules* |
| 1n | 06 | *1 nanowatt or nanojoule* |
| 3n | 07 | *3 nanowatts or nanojoules* |
| 10n | 08 | *10 nanowatts or nanojoules* |
| 30n | 09 | *30 nanowatts or nanojoules* |
| 100n | 10 | *100 nanowatts or nanojoules* |
| 300n | 11 | *300 nanowatts or nanojoules* |
| 1u | 12 | *1 microwatt or microjoule* |
| 3u | 13 | *3 microwatts or microjoules* |
| 10u | 14 | *10 microwatts or microjoules* |
| 30u | 15 | *30 microwatts or microjoules* |
| 100u | 16 | *100 microwatts or microjoules* |
| 300u | 17 | *300 microwatts or microjoules* |
| 1m | 18 | *1 milliwatt or millijoule* |
| 3m | 19 | *3 milliwatts or millijoules* |
| 10m | 20 | *10 milliwatts or millijoules* |
| 30m | 21 | *30 milliwatts or millijoules* |
| 100m | 22 | *100 milliwatts or millijoules* |
| 300m | 23 | *300 milliwatts or millijoules* |
| 1 | 24 | *1 Watt or Joule* |
| 3 | 25 | *3 watts or joules* |
| 10 | 26 | *10 watts or joules* |
| 30 | 27 | *30 watts or joules* |
| 100 | 28 | *100 watts or joules* |
| 300 | 29 | *300 watts or joules* |
| 1k | 30 | *1 kilowatt or kilojoule* |
| 3k | 31 | *3 kilowatts or kilojoules* |
| 10k | 32 | *10 kilowatts or kilojoules* |
| 30k | 33 | *30 kilowatts or kilojoules* |
| 100k | 34 | *100 kilowatts or kilojoules* |
| 300k | 35 | *300 kilowatts or kilojoules* |

| | | |
|---|---|---|
| 1meg | 36 | *1 megawatt or megajoule* |
| 3meg | 37 | *3 megawatts or megajoules* |
| 10meg | 38 | *10 megawatts or megajoules* |
| 30meg | 39 | *30 megawatts or megajoules* |
| 100meg | 40 | *100 megawatts or megajoules* |
| 300meg | 41 | *300 megawatts or megajoules* |

Status definitions

*ST1: Status for Channel #1

*ST2: Status for Channel #2

| **Hex Value** | **Address (first 5 bytes)** | **4 last bytes** | **Definition** | **In this example** |
|---|---|---|---|---|
| :000000428 | 0000 | 0428 | Wavelength in hex value | 1064 |
| :000010013 | 00001 | 0013 | Current Scale in hex value | 19= 3 mJ |
| :00002002B | 00002 | 002B | Trig Level in hex value/ 20.48 | 43/20.48= 2.1% |
| :000030000 | 00003 | 0000 | Reserved | |
| :000040000 | 00004 | 0000 | Attenuator setting<br>0000 = no attenuator<br>0001= with attenuator | No Attenuator |
| :000050001 | 00005 | 00001 | External trigger setting<br>0000 = off<br>0001 = on | On |
| :000060000 | 00006 | 0000 | Anticipation<br>0000 = off<br>0001 = on | Off |
| :000070000 | 00007 | 0000 | Energy mode for power head<br>0000 = off<br>0001 = on | Off |
| :100000000 | End of file | 0000 | | |

# 7 Maintenance and Service

| | |
|---|---|
| | **CAUTION**<br>**There are no user serviceable parts inside the 842-E-USB Optical Power/Energy Meter. Work performed by persons not authorized by Newport Corporation will void the warranty.**<br>**Calibration accuracy is warranted for a period of 1 year. After 1 year, the unit should be returned to Newport Corporation for recalibration and NIST trace ability re-certification.** |

## 7.1 Enclosure Cleaning

| | |
|---|---|
| | **WARNING**<br>**Before cleaning the enclosure of the 842-E-USB, the USB cable must be removed.** |

The enclosure should only be cleaned with isopropyl alcohol or a mild soapy water solution applied to a damp lint-free cloth.

## 7.2 USB connector for 842-E-USB

The 842-E-USB has a USB type B port. When it is connected to a PC it emulates a standard serial port. It has a simple interface so that it is easy to design software for. The 842-E-USB can function using only the USB port power.

## 7.3 Free Software Upgrade

Keep up to date with the latest version of 842-E-USB software, including new features and options. As new and improved versions of the device's firmware are created, it is in your best interest to update your 842-E-USB. The latest device firmware can be downloaded from the Newport website.

**The update must be done using the USB port.** An update through the Ethernet port will cause the 842-E-USB to be unusable and will need to be reprogrammed by the manufacturer.

Access our website at www.newport.com. Go to the **Downloads** tab. Find the file that corresponds to your 842-E-USB in the Downloads section and follow our simple, easy-to-use instructions.

## 7.4 Obtaining Service

Model 842-E-USB contains no user serviceable parts. To obtain information regarding factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

- Instrument model number (on the rear panel)
- Instrument serial number (on rear panel)
- Description of the problem.

If the instrument is to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents. Please fill out a copy of the service form, located on the following page, and have the information ready when contacting Newport Corporation. Return the completed service form with the instrument.

## 7.5 Service Form

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name _____ **Return Authorization #**_____
(Please obtain RA# prior to return of item)

Company _____
(Please obtain RA # prior to return of item)

Address _____ _____Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number _____

***Item(s) Being Returned:***

Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems):

# 8 Appendix A – Attenuator / Diffuser Calibration Procedure

## 8.1 Introduction

Newport's 818E-Series Energy Detectors are not normally calibrated with the 818E-DA-25/50 and 818E-DG-25/50 Attenuator/Diffusers. Therefore, to achieve accurate measurements, the **user** must perform a calibration. The calibration procedure is relatively simple. You will first make a measurement without the attenuator, and then with the attenuator. The ratio of these two measurements will be your correction factor.

Using the 842-PE Power & Energy Meter, make sure that the *Attenuator* setting in the *Control* menu **is not checked**. That is, it must be off. Otherwise, accessing the wavelength correction (*Settings* / *Corrections menus*) would be impossible.

## 8.2 Procedure

**Step 1**: Set up your energy detector to measure the energy of your pulsed laser. If you are working at a wavelength other than the calibrated wavelength, first make the proper correction by following the procedures given in Section 2.3.3.1 - Wavelength Setting. Make sure that the energy level is below the detector's damage threshold and your laser still has good stability.

**Step 2**: Apply energy for a few minutes to warm up the detector. This will reduce any thermal bias.

**Step 3**: Measure the energy level without the attenuator. To reduce random uncertainty you should average a number of shots. We recommend at least one hundred shots. This should reduce random errors by a factor of 10 (square root of N, assuming a Gaussian distribution).

**Step 4**: Install the attenuator. Without changing the laser settings measure the energy level by averaging the same number of shots. All laser settings must be the same as Step 3 (including beam size and position on the detector).

**Step 5**: Repeat the first measurement (Step 3) to make sure that nothing has changed during the procedure that would invalidate the calibration. A change larger than the uncertainty of your measurements means that something in the laser or environment has changed. You can either add this to your ± uncertainty when you use the attenuator or try to stabilize the laser and environment and begin again with Step 3.

The correction multiplier for the 842-E-USB will be given by:

$$T_f = \frac{\text{Reading without attenuator}}{\text{Reading with attenuator}} \qquad \text{(no units)}$$

Now use this calibration factor for the "Attenuator/Diffuser" when using it at the wavelength established in **Step 1**.

# 9 Appendix B – Disassembly Instructions

**NOTE**

These disassembly instructions are intended only for recycling at the end of the product lifetime.
For troubleshooting or servicing, users should contact the local Newport Corporation representative. There are no user serviceable parts inside the equipment.
Attempting to self-service the unit will void the warranty.

## 9.1 Recycling and Separation Instruction

This section is used by the recycling center when the monitor is at the end of its life. Breaking the calibration seal or opening the monitor will void the 842-E-USB warranty.

The complete Monitor contains

1 Monitor

1 USB cable

1 Instruction manual

1 Calibration certificate

1 Software cdrom

## 9.2 Separation

Paper: Manual and certificate

Aluminum: Monitor enclosure.

Printed circuit board: inside the monitor.

## 9.3 Disassembly

To open the monitor:

Remove all the screws on both sides of the monitor:

Remove the PCB by sliding it out of the enclosure.

# 10 Appendix C – Avoiding COM Port Increment

This procedure is to avoid the COM port to keep incrementing for new devices. Please note that the com port will change if you plug the USB cable in a different location on your PC, but it will not increment with another 842-E-USB-2 in the same USB port.

## 10.1 Procedure

### 10.1.1 Installing FT-PROG.exe Program

Connect only 1 device at a time. To run the application, follow the procedure as described below.

1. Install the USB drivers from the Newport web site.

   http://www.Newport.com/en/downloads.htm

2. Download the latest version of FT_PROG from the Utilites section of the FTDI website.

   http://www.ftdichip.com/Resources/Utilities.htm

3. Unzip all files from the .zip folder that you have downloaded.
4. FT_PROG requires Microsoft .NET Framework 2.0 installed on your system to run. This can be obtained from the Microsoft website:

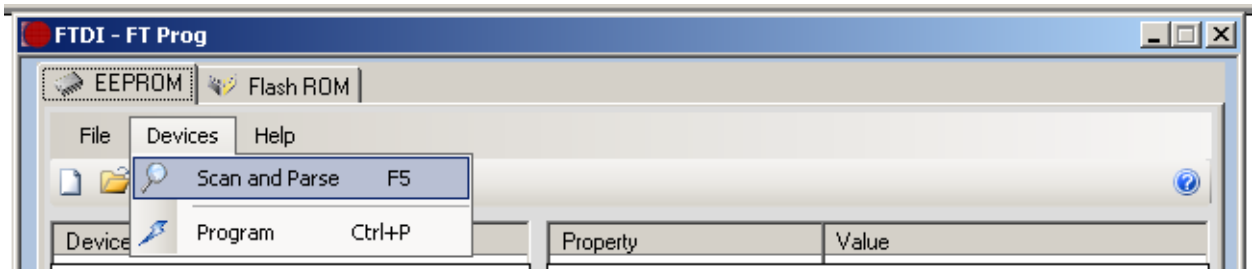
   http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en

   Download and follow the wizard for installing .NET 2.0 if you do not have this already installed on your system.

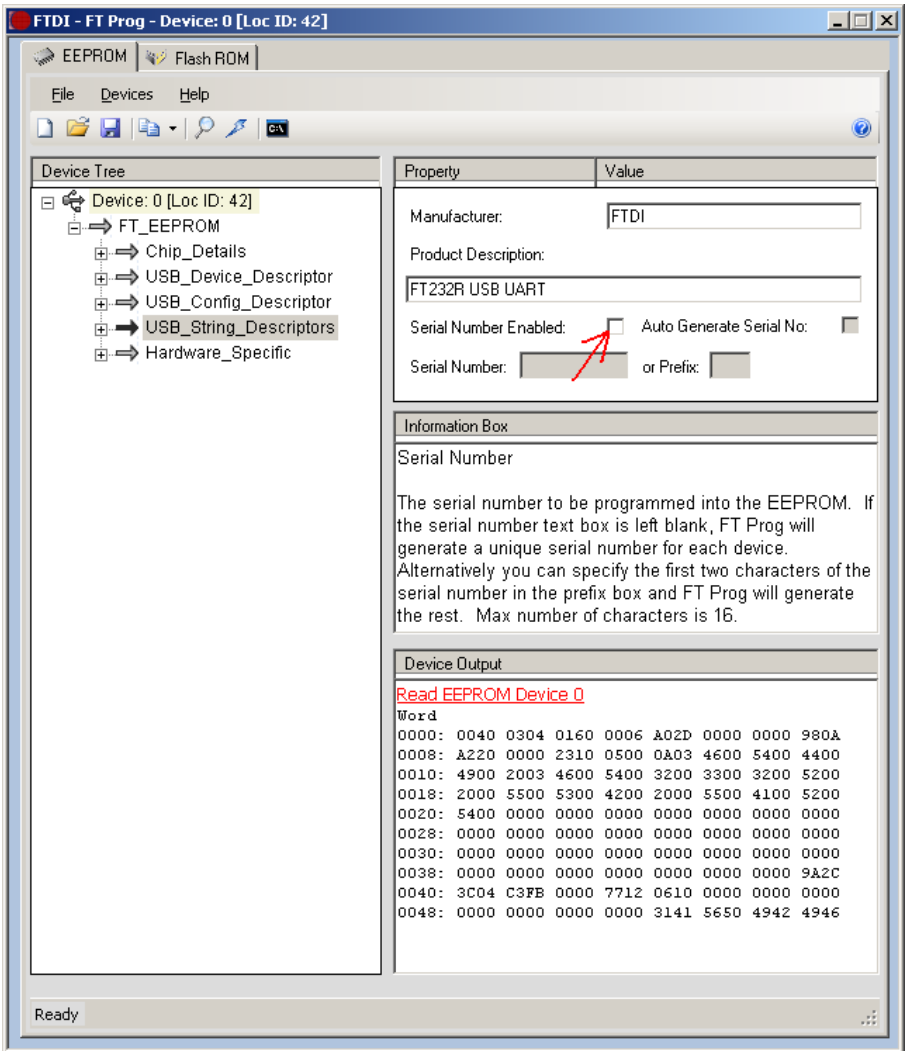
5. To run the application double click on the FT_PROG.exe icon.

### 10.1.2 Running FT-PROG.exe Program

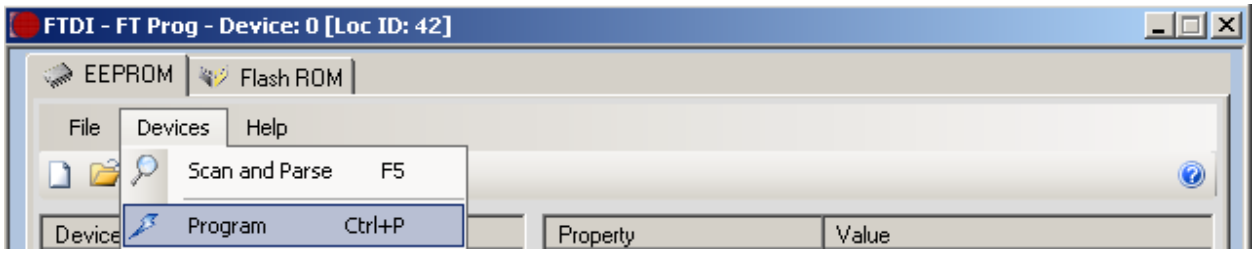
1. Click ‘Scan and Parse’, under ‘Devices’ menu.



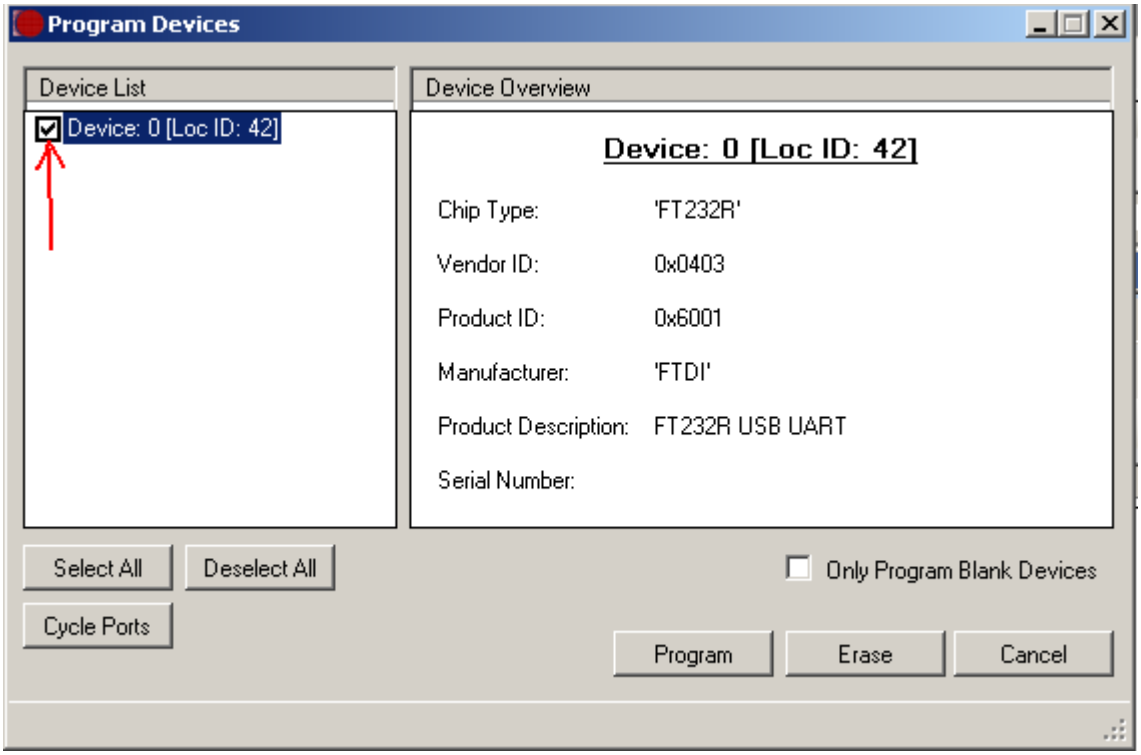

2. Unselect the Serial USB UART in the USB_String_Descriptor


FTDI - FT Prog - Device: 0 [Loc ID: 42]
EEPROM
Flash ROM
File
Devices
Help
Device Tree
Device: 0 [Loc ID: 42]
FT_EEPROM
Chip_Details
USB_Device_Descriptor
USB_Config_Descriptor
USB_String_Descriptors
Hardware_Specific
Property
Value
Manufacturer:
FTDI
Product Description:
FT232R USB UART
Serial Number Enabled:
Auto Generate Serial No:
Serial Number:
or Prefix:
Information Box
Serial Number
The serial number to be programmed into the EEPROM. If the serial number text box is left blank, FT Prog will generate a unique serial number for each device. Alternatively you can specify the first two characters of the serial number in the prefix box and FT Prog will generate the rest. Max number of characters is 16.
Device Output
Read EEPROM Device 0
Word
0000: 0040 0304 0160 0006 A02D 0000 0000 980A
0008: A220 0000 2310 0500 0A03 4600 5400 4400
0010: 4900 2003 4600 5400 3200 3300 3200 5200
0018: 2000 5500 5300 4200 2000 5500 4100 5200
0020: 5400 0000 0000 0000 0000 0000 0000 0000
0028: 0000 0000 0000 0000 0000 0000 0000 0000
0030: 0000 0000 0000 0000 0000 0000 0000 0000
0038: 0000 0000 0000 0000 0000 0000 0000 9A2C
0040: 3C04 C3FB 0000 7712 0610 0000 0000 0000
0048: 0000 0000 0000 0000 3141 5650 4942 4946
Ready

3. Select ‘Program’ under ‘Devices’ menu.



4. Select the Device in the Device list, Click on Program and close the FT_PROG software. Unplug and replug the USB device.



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